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SCIENTIFIC FALLACIES AND FRAUDS.

By W. F. HOYT, Wesleyan University, Salina.

WHETHER the Darwinian theories have played the chief part in the development of living beings is being questioned by Hugo DeVries and other present-day investigators; but that scientific theories themselves are subjected to the most rigid application of the principle of the "survival of the fittest" cannot be doubted. The pathway of human progress is strewn with the debris of cast-off theories of natural phenomena. The student is often perplexed by the facility with which science molts her outgrown coverings, but this same facility is an evidence of abounding life and vigorous growth. Each discarded theory, however, if based upon careful observation and rational deduction, served its purpose of aiding science in its search after truth, just as the varying tacks of a sailing-vessel brings it nearer its destination, though few of them were in the direct line of port.

In order to claim the serious consideration of scientists, a theory concerning natural phenomena must stand the following tests: (1) It must accord with the facts of nature, and should be based upon painstaking investigation. (2) It should furnish rational explanation of certain phenomena, without conflicting with other well-known facts. Nature is not contradictory. (3) It should be simple and ought not assume greater causes than are necessary to explain the phenomena under consideration. Nature is direct and economical in her operations. She rarely invokes an earthquake to overturn an ant-hill.

There have been in all ages, including the present one, ill-informed theorists who believe that the fancies and phantasms that course through their disordered craniums have the same stamp of divine authenticity as a prophetic vision, especially if they misquote and misapply the Scriptures in support of their theories. They have their uses, perhaps, in adding to the hilarity of thinking people, but hardly add to the sum total of human knowledge. These misconceived theories fail in one or all of the above tests. They are usually not in accord with the facts of nature, they do not furnish rational explanation for natural phenomena, nor are they

based upon accurate and adequate observation. That branch of science known as theology has its full share of freaks and frauds and fallacies, as shown by the numberless creeds that afflict the human race. The crazier the founder, and the more foolish the dogma, the more devoted are its followers in many cases. The concrete sciences, too, have their quota of fakes and fakirs. Only the sublime may have its antipode in the ridiculous.

There are two kinds of fallacies: First, those promulgated by scientific investigators, whose hypotheses have missed the true cause for the well-attested effects; and second, mere fancies which have no rational basis in natural phenomena. In the first class are a goodly list of distinguished names. Darwin's hypothesis of pangenesis to explain the facts of heredity is a typical case. Darwin was an investigator and philosopher par excellence, and his theory was somewhat less absurd than its predecessor, which predicates germ within germ within germ, *ad infinitum*. The theory of abiogenesis, or spontaneous generation, seems as tenacious of life as the fabled hydra. Every one of its multiple heads has been cut off, time and again, and by all the laws of bionomy it should have died the death long ago, but it persistently bobs up now and then, with such notables as Professors Haeckel and Loeb as sponsors, not to mention the interminable list of cranks and semi-cranks seeking notoriety. Newton's corpuscular theory of light died hard, but it died, despite the efforts of Wilford Hall *et al.* to galvanize it into life. It had a sort of *post-mortem* vindication, however, in the phenomena of radio-activity. Dalton's theory of the indivisible atom received a rude shock from the same source.

But it is with the second class of fallacies that this paper is chiefly concerned. Two or three years ago I received a pamphlet from some unknown individual in Delaware, Ohio, claiming to disprove the law of gravitation. His assumptions were not based on facts, and in closing he naively said he had not yet tested his theories, but he promised to do so as soon as he got sufficient leisure. A gentleman came into the office of Simon Newcomb, on the third floor of the Smithsonian Institution, Washington, D. C. "You astronomers are all wrong," he declared; "I can prove that there is no such thing as gravitation." "Yes, you can," replied Newcomb. "If you will jump out of that window and not fall to the ground,

you will prove your statement." "Well, Mr. Newcomb, gravitation may act near the earth's surface, but it does not extend above the atmosphere, and does not reach to the moon at all." "How do you know?" retorted Newcomb. "Have you been up there to see?"

Cosmogony is another of the favorite topics of scientific freaks. I received an ungrammatical, misspelled mimeograph letter recently, from which I quote literally: "Our Moon is a skeleton of a former planet, rising too near the sun, she lost, her gaseous belt through combustion, being now without lifting power, she plunged into space; her naked body ignited being exposed to friction against universal matter, her interior gradually burned out, and as the lava oozed out of her volcanoes, being unrestrained by atmospheric pressure, flowed unhindered into space forming gigantic talcs, as she sweeped majestically through space. Through eruptions a multitude of chambers formed in her interior, which gradually filled up with gaseous matter, by which means the former planet, transformed into a comet maintained her position and finally collided with our planet, penetrated her gaseous belt, sank deep into our atmosphere and revolutionized the whole of our planetary surface, continents disappeared and reappeared from ocean beds, mountains slid into oceans, and ocean beds raised up gigantic peaks, confusion and terror prevailed among animals, new species were created through fright and the human race became possible." There you have the whole story—astronomical, geological and biological in two stupendous sentences, for, "sweeped" on by the irresistible current of his phantasmagoria, he stops but once to breathe. No doubt the above explains the statement that "We are fearfully and wonderfully made!" The author further on asserts that Mars and Uranus consist of hydrogen, Saturn of oxygen, and Jupiter and Neptune of nitrogen, and that as these heavenly bodies sweep through our atmosphere these gases mix, and combine to form rain. The rings of Saturn, it seems, are gigantic rainbows! There is not a hint of hesitation or doubt throughout the paper. One is reminded of the caustic criticism of a similar dogmatist, "Every time he opens his mouth he subtracts from the sum total of human knowledge!"

The above is only one of the worst of the phantasms which the freaks perpetrate upon the long-suffering public. I have in my possession a bound pamphlet from an "M. D.," of

Evansville, Ind., who makes electricity the "Open Sesame" to the universe. It causes gravitation, planetary motions, the heat of the sun, glaciers, earthquakes, the rings of Saturn (and of Jupiter also, according to his pamphlet), sun-spots, etc. Many of his so-called facts are figments, and others are badly garbled facts. A college education, including an elementary course in electricity and astronomy, would increase his store of knowledge, and incidentally his respect for natural phenomena.

A few years ago I received postpaid a sample copy of a cloth-bound book of some 200 pages of as rich, unconscious humor as I ever read. As a sample, the author insisted that the stratified rocks of the earth were wound upon our globe as a revolving spindle, from the cometary visitants to the solar system. A comet coming near the earth would get its tail tangled on the rapidly revolving earth and be wound upon it, forming a particular geological layer. A proof of this theory is the regular geological formations of differing materials, that must have come from different comets—if not, from what source could they come, pray tell me that? I sat up to the wee hours one night to complete this book, and I felt like Henry Ward Beecher after finishing *Uncle Tom's Cabin* under similar circumstances—"If Harriet should write another such book, it would be the death of me!"

A similar publication, that comes geographically nearer home, contains some interesting modifications of the above theories, and some startling information to the humdrum scientist. The author modestly promises to revolutionize science and "place it on a higher plane." He begins by explaining that the original earth was a perfect sphere, but that its present spheroidal shape is due to the loose "originary" matter wound upon it in much the same way as explained above. The original earth was made up of globular masses of this same "originary" matter, the interspaces of which were filled up with water, which was decomposed by the heat generated by pressure, and its elements, uniting with carbon, formed petroleum and natural gas. Gravity, too, is due to electricity, and like it may be reversed and become a force of repulsion rather than attraction. He proves this by the phenomena attending cyclonic disturbances, a theory that simplifies the terrible lifting power of tornadoes. He forestalls Nikola Tesla by announcing that the Martians have been bom-

barding us with messages in the form of meteorites propelled by reversed gravity, lo, these many years. A meteorite that fell near Rochester, N. Y., several years ago, by the indubitable testimony of a public school teacher of that city, and the *New York Sun*, has some cuneiform writing that must be a celestial message, from Mars in all probability. One thing to be regretted is that the author failed to translate this "coelogram," a feat much less tiring to the imagination than the formation of many of his truly original hypotheses. Bodily nutrition and growth are very simple phenomena, identical, in fact, with electroplating, with the "tissue atoms" as the ions. Space he proves in three short sentences, without any of the usual preliminary investigation so necessary to the ordinary clumsy intellect, to be the "originary" matter from which all other matter is derived, and incidentally to be unlimited in extent. The famous whirlpool nebula he calls "Cane's Venatici," but fails to identify the Mr. Cane after whom it was probably named. He has a much more intimate knowledge of the moon than any other scientist, as is clearly shown by a cut which he insists is a photograph, but which bears some of the earmarks of a woodcut. The photograph, if authentic, must have been exposed somewhere on our satellite's surface.

But it is in connection with the polar regions his volume is most replete with original information. As one sails due northward, at about eighty degrees latitude the polar star rapidly approaches the zenith and drifts to the rear of the vessel. One wonders if his data for this interesting piece of information is not the nautical yarn concerning the apprentice pilot whom the captain left in charge of the wheel with the injunction to steer straight for the north star. A few minutes later the captain was aroused by a call to come up and pick out another star, as the vessel had passed the other one. The regions about the poles, contrary to the usual belief, are the hottest places on the globe during their long day, and, of course, the coldest during their long night. He darkly hints that Andre certainly perished from excessive heat, if he ever succeeded in approaching the pole. During the arctic night the temperature frequently falls so low that liquid air falls as a gentle rain. This is stated on the testimony of "many explorers." Glaciers consist of alternate layers of ice and liquid air. There are several polar islands

that consist wholly of the carcasses of mammoths and other giant vertebrates, piled upon one another from the sea bottom to the surface, and so well preserved that their flesh is eaten by Esquimaux and arctic carnivora. Really, our friends Sternberg, Henry, Fairfield, Osburn, and other paleontologists should be informed by wire of these inexhaustible deposits, so they will not waste any more time on the barren deserts of Africa and our own West. The change of climate in polar regions, from tropic heat to arctic cold, was so sudden that many of these huge beasts were "frozen while peacefully grazing on the previously unfrosted vegetation." One is reminded of the naive remark of a four-year-old boy, after gazing on some good specimens of taxidermal skill—"How did they get them dead standing?"

The laws of the conservation of matter and force are points for attack upon prevailing theories. Inventions have been multiplied to secure perpetual motion, or to do work without the expenditure of an equivalent amount of energy. For twenty odd years a man by the name of Keeley induced the public, including many capitalists, to believe he had discovered an occult force hitherto unknown, that was utilized in his laboratories to run a machine, called after him the Keeley motor. He was constantly on the point of perfecting it so it could be put to practical use. For a quarter of a century hard-headed business men of New York, after a look into his laboratory at the motor buzzing away without any apparent expenditure of energy, invested thousands of dollars to enable him to complete his invention. After his death, an investigation of the laboratory revealed that the occult force was plain compressed air contained in tubes concealed beneath the floor, and Keeley slipped into his place among the fakirs.

Last year the papers of the state contained descriptions of an application of a windmill to secure locomotion. Its inventor, a Kansan, gravely claimed his machine would run faster against the wind than with it, because the windmill would turn faster in such case. Mr. Chas. Trippler, of New York, the first man to manufacture liquid air in large quantities in this country, in an article in the McClure, several years ago, claimed he could run his machine with liquid air and at the same time produce more liquid air than he used for motive power. He has probably reread and meditated upon the law of conservation since that date.

Radio-activity is sometimes referred to as violating the law of conservation, because radium and other radio-active elements seem to give off energy and emanations without loss of matter or force. This is only an apparent contravention, however, because radium and all other radio-active substances do lose both matter and energy through their emanations, but so slowly as not to be easily detected. Radio-activity is now known to consist in a slow disintegration, a breaking up into less complex elemental substances of lower density.

There are other scientific pretensions which ought not to be euphemistically considered fallacies, because their promulgators are not self-deceived, except in so far as they think they can deceive all the scientific world all the time, for fraud, like murder, will out, sometime, somewhere. The less-pleasing term, fake or fraud, is more accurate and apt. The famous Cardiff giant is sufficiently distant, in scientific time at least, to excite only a reminiscent smile. It has had many successors, but none so successful. The widely-advertised Calaveras skull is not so ancient as not to cause a wry face and nausea even as "Poor Yorick's." That the cranium of a Digger Indian should have been accepted as that of Tertiary man, even by the elect, is not a pleasant thought. A most amusing instance of attempted fraud fell under my observation a few years ago. Stepping into a clothing establishment, my attention was called to a very fine display of sea life in a large wall case. There were seaweed, sponges, coral, flying-fish, etc.; and last, but not least by any means, a perfectly preserved specimen of a mermaid. There it was before my wondering eyes as plain as it ever manifested itself to the gaze of any mediæval seafaring man—half scaly fish, and half anthropoid ape. The mermaid thus was rescued from the castle of myths and handed over to the taxonomist for classification as best he may. The proprietor, in answer to my questions, very glibly and with seeming pride informed me those specimens came from near Los Angeles, and asserted that he had caught the mermaid himself.

From repeated deception the scientist is learning extreme caution concerning alleged discoveries and revolutionary theories. There are many mysteries which science has never explained, and may never solve, but thanks to the patient investigator and the keen philosopher, there are some things we do know, even if seen as "through a glass darkly." One

of these certainties is that if the established facts and principles of modern science are ever overthrown it will be by the trained scientist with microscope, telescope and spectroscope, not by the ignoramus with a divining-rod. Russia, the typical military power, was defeated, not by the undisciplined hordes of Asia, but by Japan, with all the enginery of militarism, together with trained and disciplined men behind the guns. In like manner, scientific tenets can be disproved only by the rigid laboratory methods of present-day science.